

# **OPERATING EXPERIENCE WEEKLY SUMMARY**

**Office of Nuclear and Facility Safety**

**April 3 through April 9, 1998**

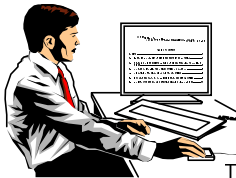
**Summary 98-14**

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## Table of Contents

EVENTS .....	1
1. LEAD COMPLIANCE PROGRAM CONCERNS AT THE SAVANNAH RIVER TECHNOLOGY CENTER.....	1
2. RADIATION WORK PERMIT VIOLATION .....	3
3. NUCLEAR SAFETY VIOLATIONS AT PORTSMOUTH.....	6



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## **EVENTS**

### **1. LEAD COMPLIANCE PROGRAM CONCERNS AT THE SAVANNAH RIVER TECHNOLOGY CENTER**

On April 2, 1998, at the Savannah River Technology Center, facility managers determined that elements of the lead compliance program did not provide adequate guidance to protect workers. The site lead compliance program stated that workers could move ten lead bricks during pre-defined tasks without additional lead-specific administrative and engineering controls, but it did not specify what constituted a pre-defined task. Program administrative and engineering controls included training, wearing respirators, and monitoring worker blood lead levels. Based on program deficiencies identified by facility managers, the Center operations manager curtailed all Center lead handling performed without facility industrial hygienist approval. Improper handling of lead can lead to personnel intake of toxic amounts of lead. Inadequate lead management may result in an uncontrolled release of contaminated lead to off-site processors or improper disposal of lead. (ORPS Report SR--WSRC-LTA-1998-0012)

Investigators determined that several workers moved lead bricks, ten at a time, from the Savannah River Technology Center to another area at the Savannah River Site during housekeeping activities that required relocating several thousand pounds of lead. They also determined that not all of the lead at the Center was in the form of lead bricks; some was in the form of shot, sheets, vessels, and other miscellaneous shapes. Facility managers and site industrial hygienists are evaluating site and facility lead management practices and procedures and determining how the site lead compliance program can be improved.

NFS reported an event in Weekly Summary 95-11 concerning worker exposure to lead while removing lead paint from the inside of a tank. Facility personnel at the Los Alamos National Laboratory reported that blood tests from five of six workers indicated a lead content above the action level for OSHA. The action level is 40 micrograms of lead per deciliter of blood. This level requires written notification to the worker and increased biological monitoring. The blood levels of the five workers ranged from 40 to 70 micrograms of lead per deciliter of blood. One worker experienced symptoms suggesting lead exposure. (ORPS Report ALO-LA-LANL-PHYSTECH-1995-0004)

OEAF engineers reviewed the ORPS database for similar occurrences and found 31 reports involving either occupational exposure to lead in various forms or release of lead to the environment. A review of these occurrences shows that managers assigned a root cause of management problem to 58 percent of these occurrences. Approximately 44 percent of the management problems were attributed to inadequate administrative control. Following are some examples of occurrence reports involving occupational exposure to lead.

- On December 11, 1991, industrial hygienists at the Idaho National Engineering and Environmental Laboratory determined that analytical results of routine air sampling indicated that workers handling lead bricks were exposed to airborne lead in excess of the OSHA permissible exposure limit. The workers did not wear respiratory protection. Between October 7 and October 16, 1991, workers accumulated, segregated, and radiologically surveyed 205 lead bricks for transfer to a lead storage facility. All bricks were surveyed and found to be radiologically clean. Industrial hygienists performed air sampling to document the absence of any airborne lead hazard, although they did not anticipate any airborne hazard. Industrial hygienists determined that one air sampler detected 155 micrograms of

lead per cubic meter of air. The OSHA permissible exposure limit is 50 micrograms per cubic meter averaged over an 8-hour workday. As a result of this event, facility managers implemented corrective actions that included revising lead management standard operating procedures. (ORPS Report ID--WVNS-HWSL-1991-1003)

- On March 20, 1992, three technicians at the Lawrence Livermore National Laboratory moved approximately 450 lead bricks at the Experimental Test Accelerator II without wearing respiratory protection. Industrial hygienists instructed the technicians to wear personal air samplers throughout the 90-minute move to gather data on lead operations, but they did not expect airborne lead levels to reach OSHA permissible exposure limits. Industrial hygienists determined that two of the technicians were exposed to greater than the OSHA permissible exposure limit for lead; one was exposed to 104 micrograms per cubic meter. Industrial hygienists repeated the measurements on April 13, 1992, using 3 supervisory personnel wearing respiratory protection to move 400 lead bricks. Industrial hygienists determined that two of the three supervisors were exposed to airborne lead at or above the OSHA permissible exposure limit for lead. Investigators determined that lead-oxide dust was disturbed during brick handling and became airborne. As a result of this event, facility managers implemented corrective actions that included instituting site-wide programmatic limits on handling lead. (ORPS Report SAN--LLNL-LLNL-1992-0041)

These events underscore the importance of having and using a good lead management program. Lead exposure while transferring and handling lead bricks is not a commonly recognized hazard. In all of these events, work planners did not anticipate that workers would be exposed to hazardous levels of lead while handling lead bricks. A good lead management program should also provide guidance on controlling radiologically contaminated lead on site. On March 31, 1998, at the Savannah River Technology Center, safety and health operators found a "legacy" contaminated lead brick on a cart located outside a radiologically controlled area. A good lead management program will also help prevent radiologically contaminated lead from being released to off-site processors or to the environment. Lead management program developers should review the following references.

- DOE 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, requires all DOE elements to identify existing and potential workplace hazards and evaluate the risk of associated worker injury or illness. The Order also requires DOE elements to assess worker exposure to chemical, physical, biological, or ergonomic hazards through appropriate workplace monitoring (including personal, area, wipe, and bulk sampling), biological monitoring, and observation.
- DOE 5480.4, *Environmental Protection, Safety and Health Protection Standards*, requires compliance with many regulations and permits, such as the Resource Conservation and Recovery Act. The Act specifies treatment, storage, and disposal requirements for hazardous materials such as lead from "cradle to grave." Failure to comply exactly with these environmental regulations can result in civil penalties.
- 29 CFR 1926.62, *Lead*, applies to employees who may be occupationally exposed to lead. The regulation states that the employer shall ensure that no employee is exposed to lead at concentrations greater than 50 micrograms per cubic meter of air averaged over an 8-hour period. The regulation also states, in part, that until an

employer performs an exposure assessment, the employer shall treat the employee as if the employee were exposed above the permissible exposure limit and shall implement employee protective measures including respiratory protection, awareness training, and blood sampling.

Inhalation is the primary means of taking lead into the body, although it may also be absorbed through the digestive tract. Acute lead exposure may result in seizures, coma, and death from cardiorespiratory arrest. Chronic exposure may result in severe damage to blood-forming, nervous, urinary, and reproductive organs. Additional information on lead may be found at the National Lead Information Center. The Center's primary goal is to gather and provide information on environmental lead poisoning and prevention for health professionals and the public at large. The Center may be reached at 800-LEAD-FYI. The Center also operates a clearinghouse (800-424-LEAD) staffed by trained information specialists who can provide in-depth technical information on lead-related issues. The Center's URL is <http://www.nsc.org/ehc/lead.htm>.

**KEYWORDS:** air monitoring, hazard analysis, industrial hygiene, respirator

**FUNCTIONAL AREAS:** Industrial Safety, Materials Handling/Storage, Work Planning

## 2. RADIATION WORK PERMIT VIOLATION

On March 30, 1998, at the Los Alamos National Laboratory Accelerator Complex, a facility manager reported that a Neutron and Nuclear Science employee completed a modification project without reading and following radiation work permit requirements. While reviewing closed-out radiation work permits, the radiological control technician was unable to find radiation work permit information for maintenance performed on a hydrogen moderator system in January, so he contacted the employee who performed the work. The employee admitted that he did not read the permit and did not contact radiological control personnel before performing the maintenance. The radiological control technician knew the radiation work permit requirements had been violated and was concerned that the employee could have spread contamination. Radiological control technicians performed smear surveys of the work area and determined that there was no spread of contamination. Performing work without following radiation work permit requirements can result in personnel radiation exposures and the spread of contamination. (ORPS Report ALO-LA-LANL-ACCCOMPLEX-1998-0004)

Investigators determined that because the employee did not read the radiological work permit he was unaware of the requirements. They determined that he failed to wear anti-contamination clothing while performing the maintenance and that he failed to contact radiological control personnel to (1) provide continuous radiological coverage; (2) perform job-specific air sampling; (3) establish a radiological buffer area; and (4) perform radiological surveys for personnel, equipment, and tools when the job was completed.

The facility manager held a critique and determined that personnel error was the probable cause of this event. Critique members determined that procedures require workers to read and understand radiation work permit requirements before signing them. Critique members learned that the employee was aware that the system he was working on was potentially internally contaminated and used contamination management practices to avoid spreading contamination. The facility manager continues to review this event and develop corrective actions.

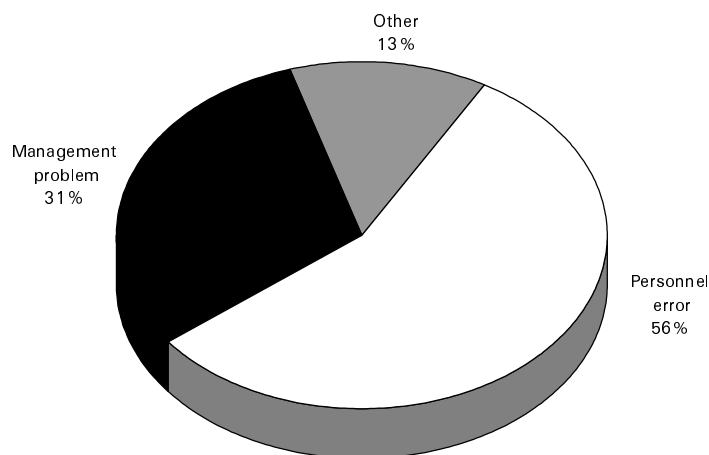
The Price-Anderson Amendments Act of 1988 subjects most DOE contractors covered by the DOE Price-Anderson indemnification system, as well as their subcontractors and suppliers, to civil

penalties for violations of applicable DOE nuclear safety rules. The primary consideration for determining whether DOE takes enforcement action is the actual or potential safety significance of the violation, coupled with how quickly the contractor acts to identify and correct problems. DOE-STD-7501-95, *Development of DOE Lessons Learned Programs*, discusses management's responsibility for incorporating appropriate corrective actions in a timely manner.

NFS has reported radiation work permit violations in several Weekly Summaries. NFS also reported assessments of civil penalties for radiation protection violations under the Price-Anderson Amendments Act in several Weekly Summaries. Following are some examples.

- Weekly Summary 97-01 reported that the DOE Office of Enforcement and Investigation issued a Preliminary Notice of Violation under the Price-Anderson Amendments Act to Petsco and Son, Inc., a general contractor to Brookhaven National Laboratory, and an Enforcement Letter to the Laboratory for noncompliance with 10 CFR 835 requirements. These potential noncompliances involved a number of instances of contractor or subcontractor failure to (1) comply with area radiological warning signs; (2) use protective clothing and equipment; (3) maintain radiation exposures as low as reasonably achievable; and (4) complete radiological worker training. The maximum exposures from the noncompliances were 40 mrem each for two individuals; however, the exposures were unplanned and preventable. [NTS Report NTS-CH-BH-BNL-PE-1996-0001; letter, DOE (T. O'Toole) to Brookhaven National Laboratory (N. Samios), 12/18/96]
- Weekly Summary 96-30 reported that four technicians and a supervisor at the Pantex Plant were working in the contamination area of a compactor room and did not comply with a radiation work permit requirement that personnel entering the area must be in the tritium bioassay program. The technicians and the supervisor had received a memorandum from the Radiation Safety Department in March 1996 that removed them from the program. They continued to work in the compactor room because they believed that the memorandum exempted them from the requirement, and they did not provide monthly bioassay samples. (ORPS Report ALO-AO-MHSM-PANTEX-1996-0155)

OEAF engineers reviewed the ORPS database for radiation work permit violations from 1990 to present and found 325 events. Figure 2-1 shows the distribution of root causes for these events. A review of these events shows that facility managers reported 56 percent of the events as personnel error, with 51 percent attributed to procedure not used or used incorrectly and an additional 39 percent attributed to inattention to detail. In addition managers reported 31 percent as a management problem, with 33 percent attributed to policy not adequately defined, disseminated, or enforced.



**Figure 2-1. Root Causes for Radiation Work Permit Violations<sup>1</sup>**

These events illustrate the need for workers to be accountable and consider the consequences of performing work outside the scope of procedures, radiological work permits, and work packages. In this event, the Neutron and Nuclear Science employee could easily have been contaminated, spread contamination, or created a radiation area by performing the maintenance without following the radiation work permit requirements. The purpose of the permit is to clearly inform workers of conditions and entry requirements. When workers violate the requirements, they increase the probability of the spread of contamination and exposure to radiation. Workers must guard against complacency when performing routine work. Workers must also read and understand permits before signing them. Before signing a radiological work permit, personnel should be aware of (1) radiological conditions, (2) dosimetry requirements, (3) training requirements (4) protective clothing and respiratory protection requirements, (5) stay times, and (6) conditions that may void the radiological work permit.

Personnel working at DOE facilities should have a continually questioning attitude toward safety issues. Each individual is ultimately responsible for complying with rules to ensure personal safety. Facility managers should communicate a sound policy stressing that safety is of prime importance and that all personnel must exhibit an individual commitment to excellence and professionalism. Managers should ensure that radiological protection practices are followed and enforced.

- DOE/EH-0256T, *Radiological Control Manual*, states: "Each person involved in radiological work is expected to demonstrate responsibility and accountability through an informed, disciplined, and cautious attitude toward radiation and radioactivity." The manual sets forth DOE guidance on the proper course of action in the area of radiological control, including work preparation; work controls; monitoring and surveys; and training and qualifications. Section 122, "Worker Attitude," states: "Minimizing worker radiation exposure can be achieved only if all persons involved in radiological activities have an understanding of and the proper

<sup>1</sup> OEAF engineers searched the ORPS database using the graphical user interface for reports with a nature of occurrence of "01F, violation/inadequate procedures" AND narrative containing "radiation work permit" OR "radiological work permit" OR "RWP" from 1990 to present and found 325 events. Based on a random sampling of 25 events, OEAF engineers determined that each slice is accurate within  $\pm 0.8$  percent.

respect for radiation." Section 123, "Worker Responsibilities," states that trained personnel should recognize that their actions directly affect contamination control, personnel radiation exposure, and the overall radiological environment associated with their work. The first rule of worker responsibility is to obey posted, written, and oral radiological control instructions and procedures, including instructions on radiological work permits. Section 322, "Use of Radiological Work Permits," states that workers shall acknowledge that they have read, understood, and will comply with the radiological work permit before initial entry to the area and after any revisions to the permit.

**KEYWORDS:** radiological work permit, violation

**FUNCTIONAL AREAS:** Radiation Protection

### 3. NUCLEAR SAFETY VIOLATIONS AT PORTSMOUTH

This week OEAF engineers reviewed a recent Nuclear Regulatory Commission (NRC) news announcement concerning nuclear criticality safety and self-assessment programs at the United States Enrichment Corporation Portsmouth Plant. The news announcement stated that the Commission proposed a \$55,000 fine against the licensee for violations identified during an NRC inspection conducted from December 8, 1997, to January 9, 1998. On March 19, 1998, the NRC issued a Notice of Violation and a proposed civil penalty for criticality safety and self-assessment program violations. The violations involved the licensee's failure to (1) store containers and equipment containing uranium with the required spacing between them; (2) train personnel adequately; (3) conduct effective inspections and audits of the program; and (4) find and correct problems in the safe handling and storage of uranium. Portsmouth transitioned from a DOE facility to an NRC facility on March 3, 1997. (NRC NEWS ANNOUNCEMENT III-98-19)

The NRC determined that the violations constituted significant concerns because the root causes spanned the criticality safety program and represented an increased risk for fissile material operations. The NRC also determined that the licensee did not effectively identify the scope and magnitude of problems associated with the facility nuclear criticality safety program or ensure that appropriate corrective actions were taken. The NRC news announcement stated: "While the violations did not result in an immediate safety issue, the magnitude of the underlying problems indicates that the facility was not effective in identifying and promptly correcting these problems and that significant NRC effort was necessary to focus the facility's corrective action processes in order to obtain comprehensive corrective actions."

The licensee determined that the root cause of the violations was inadequate management of the oversight processes used to develop criticality controls and monitor day-to-day implementation of the approved controls. The licensee has until April 20 to pay the fine or to protest it. If the fine is protested, but subsequently imposed by the NRC staff, the licensee may request a hearing. The licensee agreed with the violations when NRC staff presented them during a pre-decisional enforcement conference on February 19, 1998. Following is a summary of the violations that the NRC identified.



**AUDIT AND INSPECTION VIOLATIONS**

- The licensee's self-assessment programs failed to (1) identify, record, or correct existing inconsistencies between operations and the applicable nuclear criticality safety evaluations and approvals; or (2) incorporate the results of previous generic findings, resulting in the recurrence of previously identified deficiencies.
- The licensee's audit program failed to identify that (1) the nuclear criticality safety self-assessment program was not identifying differences between criticality safety evaluations and approvals and how operations were actually conducted; (2) inconsistencies existed between the safety analysis report management controls and those delineated in plant procedures; and (3) nuclear criticality safety requirement deficiencies continued to recur.
- The licensee failed to use approved procedures to conduct nuclear criticality safety activities and walkdowns.
- The licensee failed to (1) correct nuclear criticality safety deficiencies adverse to quality as soon as practical, (2) determine the cause of deficiencies, and (3) take corrective actions to preclude their recurrence.
- The licensee failed to promptly identify, correct, and implement corrective actions to preclude recurrence of a previous NRC violation involving uranium operations that were performed without a documented nuclear criticality safety evaluation and without approval.

**TRAINING VIOLATIONS**

- The licensee failed to ensure that several technical safety training requirements were met. The NRC determined that (1) no criticality safety training documentation existed for four nuclear criticality safety contractors; (2) three nuclear criticality safety engineers did not perform evaluations under the direction of a senior nuclear criticality safety engineer before being qualified; and (3) a criticality safety manager did not receive criticality safety training.

**STORAGE-RELATED VIOLATIONS**

- The licensee failed to implement procedural controls for a waste storage bottle attached to an atomic absorption unit that was used to analyze samples. The NRC determined that the bottle volumes were greater than allowed and that no one performed a second verification of the container volume.
- The licensee failed to ensure procedural spacing requirements were met for (1) uranium-bearing high-efficiency particulate air ventilation units, (2) uncharacterized drums of dry activated waste, (3) blow-out prevention actuators, and (4) two groups of stored seals.

## PROCEDURAL AND IMPLEMENTATION VIOLATIONS

- The licensee failed to (1) maintain pressure in a freon coolant system greater than the pressure for a uranium hexafluoride system and for a re-circulating cooling water system and (2) ensure that a condenser drain valve was kept open as required by technical safety requirements.
- The licensee failed to develop procedures for nuclear criticality safety approval violations as required by technical safety requirements.
- The licensee failed to maintain area postings subject to nuclear criticality safety controls in multiple areas as required by technical safety requirements.

The NRC considered reducing the proposed fine but determined it was not warranted because of the significant NRC involvement required to ensure comprehensive corrective actions. The NRC news announcement stated that, although the United States Enrichment Corporation identified many of the nuclear criticality safety program problems, it failed to recognize the existence of major programmatic problems in this area.

The NRC proposes civil penalties for commercial nuclear utilities, uranium fuel fabricators, and other nuclear-related companies for violations of procedures, work instructions, and design requirements. Under the provisions of the Price-Anderson Amendments Act, DOE can fine contractors for violations of Department rules, regulations, and compliance orders relating to nuclear safety requirements.

DOE contractors who operate nuclear facilities and fail to implement corrective actions for identified deficiencies could be subjected to Price-Anderson civil penalties under the work processes and quality improvement provisions of 10 CFR 830.120, *Quality Assurance Requirements*. These actions include Notices of Violation and, where appropriate, non-reimbursable civil penalties. The primary consideration for determining whether DOE takes enforcement action is the actual or potential safety significance of the violation, coupled with how quickly the contractor acts to identify and correct problems. The Office of Enforcement and Investigation may reduce penalties when a DOE contractor promptly identifies a violation, reports it to DOE, and undertakes timely corrective action. DOE has the discretion not to issue a Notice of Violation in certain cases. The Noncompliance Tracking System (Weekly Summaries 95-17 and 95-20) provides a means for contractors to promptly report potential noncompliances and take advantage of provisions in the enforcement policy. DOE STD-7501-95, *Development of DOE Lessons Learned Programs*, discusses management responsibility for incorporating appropriate corrective actions in a timely manner.

**KEYWORDS:** nuclear criticality safety, special nuclear material, notice of violation, compliance, corrective actions, Price-Anderson Act

**FUNCTIONAL AREAS:** Nuclear/Criticality Safety, Licensing/Compliance, Configuration Control, Lessons Learned